Imperial Agricultural Bureaux

Fifteenth Annual Report

OF THE

Executive Council

1943-1944

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PREFACE

The Imperial Agricultural Research Conference, 1927, stressed (*a*) the need for scientists to be in touch with the progress of research throughout the world in their several branches, and (*b*) the difficulty therein owing to the great output of scientific literature and the diversity of languages in which it is published.

2. It recommended the Governments of the British Commonwealth to establish on a joint co-operative basis eight bureaux to collect, collate and disseminate information on research in eight selected branches of agricultural science and generally to assist research workers in the Empire with information relevant to their subjects. Each bureau was to be located at a research Institute specializing in its own branch of science so that the bureau officers should be in daily contact with men engaged on research in its own subject. These bureaux were to be financed from a common fund contributed by Empire Governments in agreed proportions and controlled by a Council composed of representatives of those governments on an equal footing.

3. Governments accepted these proposals. In November, 1928, a new type of inter-Imperial co-operative agency acceptable to all governments was worked out in detail. On 1st April, 1929, the Executive Council of the Imperial Agricultural Bureaux came into being. The eight bureaux started work in that year.

4. Following the Ottawa Conference of 1932 the work of several inter-Imperial agencies was examined and reported upon by the Imperial Committee on Economic Consultation and Co-operation (1933). This Committee approved of the bureaux organization and of its work, and extended the duties of the Council, *inter alia* proposing that with effect from 1st October, 1933, it should also be responsible for the supervision and administration and finance of the Imperial Institute of Entomology and of the Imperial Mycological Institute.

5. It also enunciated certain general principles to be observed in regard to the organization of agencies for inter-Imperial co-operation and consultation, *e.g.*, Constitutional equality of participating governments in the appointment of the Authority administering the work; the provision of adequate finance for a definite period of years; careful and periodical examination of the work and organization of the Agency at Empire conferences suitable for the purpose, as without that assurance governments could hardly be expected to provide the adequate continuing finance; responsibility of the administering authority to all participating governments. All Governments accepted this report.

6. The British Commonwealth Scientific Conference (1936) conducted the first of these "periodical examinations." It approved both the work and organization. It recommended the finance necessary until 1941/42, its distribution between governments, also the formation of two more bureaux, and certain modifications in practice designed to improve general efficiency. Governments accepted these proposals.

7. The organizations under the administration of the Executive Council are :—

The Imperial Institute of Entomology, with its branch, the Imperial Parasite Service.

The Imperial Mycological Institute and the Imperial Bureaux of

Soil Science.
Animal Health.
Animal Nutrition.
Animal Breeding and Genetics.
Plant Breeding and Genetics.
Pastures and Forage Crops.
Horticulture and Plantation Crops.
Agricultural Parasitology (Helminthology).
Dairy Science.
Forestry.

8. A "liaison" officer appointed by the appropriate department in each participating country keeps in touch with administrative matters, and in each country for each bureau a scientific officer is nominated as Official Correspondent to be "the general friend" on scientific matters of that bureau in that country. The Heads of the several Institutes at which bureaux are located act as Directors of the bureaux, thus giving the Council and bureaux the benefit of their wide experience and scientific knowledge. All other officers are whole-time servants of the Executive Council.

As a war economy, the usual list of publications has been omitted from this report. Copies of the 1944 List are however, available for those desirous of consulting them, and will be supplied on application to :

The Imperial Agricultural Bureaux, Central Sales Branch,
Agricultural Research Building, Penglais, Aberystwyth, Wales,
or to the Secretary, Imperial Agricultural Bureaux,
2, Queen Anne's Gate Buildings, Dartmouth Street, London, S.W.1.

REPORT

At its meeting on 28th March, 1945, the Executive Council of the Imperial Agricultural Bureaux adopted the following report on its fifteenth year's work—1st April, 1943, to 31st March, 1944.

2. Mr. J. W. Dulanty, C.B., C.B.E., High Commissioner for Ireland, joined the Council as representative of Eire in succession to Mr. J. M. Adams who retired during the year from Government Service.

Mr. S. Lall who represented both India and Burma on the Council and had been Chairman in the two previous years returned to India. Sir David Meek, C.I.E., O.B.E., joined the Council as representative of India and Mr. B. O. Binns, O.B.E. as the representative of Burma.

Dr. W. J. Hall, M.C., D.Sc. (formerly Entomologist and Director, the British South Africa Company's Citrus Experimental Station, Mazoë, S. Rhodesia) joined the staff of the Imperial Institute of Entomology as Senior Entomologist. No other changes took place among the senior officers in the Institutes and Bureaux.

3. Mr. G. V. Jacks, Deputy Director of the Imperial Bureau of Soil Science attended the Conference on Middle East Agricultural Development held in Cairo February 7th–10th, 1944, in which about 100 took part, consisting mostly of Directors of Agriculture, or their equivalent, and of scientists engaged in agricultural development and research. Ten Middle East countries were primarily concerned. India, Uganda and Malta were also officially represented.

Since the early days of the bureaux and as recently as Lord Hankey's Committee the need for developing personal contacts between bureaux officers and those whom they serve has been repeatedly reiterated. Opportunities for extending those contacts have been few during the War. The Council is all the more grateful to the Middle East Supply Centre and to the Ministry of War Transport for giving one of its officers an invitation to this Conference. It enabled Mr. Jacks to meet at one time officers from several countries and in the tours, on which he was subsequently taken in Egypt and Palestine, to see something of a type of agriculture with which hitherto he was not familiar. It is hoped that this visit may lead to closer relations between the bureaux generally and those countries.

4. The more favourable course of the war in 1943–44 had its effect upon the bureaux. The demand for their publications slowly expanded and has continued to expand. Some of the Allied Nations began to take steps to ensure that the copies of publications issued during the war would be available to their research institutes and departments on the liberation of their countries. Thought began to be given to the conditions which might prevail post war. The report of Lord Hankey's Committee, summarized in the report of the previous year, was published in the year and was well received. In May, 1943, the United Nations Conference on Agriculture and Nutrition which had been meeting at Hot Springs published its report with its recommendation that an Interim Commission be appointed by the Governments to work out in greater detail the duties and organization of the Permanent Organization on Food and Agriculture which it was proposed should be established. The Interim Commission was at work during the year. As regards the collection and dissemination of scientific information on agriculture the Interim Commission has recommended as follows :

> "123. There are advantages in having abstracting and other information services supplied as far as possible by institutions that are already doing outstandingly good work of this kind. The Organization should therefore seek arrangements whereby certain present information services, which are extensive and valuable, might receive wider circulation and perhaps be extended to those parts of the field which are not now covered. The Organization should explore such possibilities, for example, with the appropriate authorities of the Imperial Agricultural Bureaux, the Pasteur Institutes, and Inter-American Institute of Agricultural Sciences, and national research councils or academies in various countries."

5. Thus from several directions came indications of increased use of the bureaux and of increased duties. Though the restrictive effect of the war was passing its cumulative financial effect became crushing. The contributions from governments still remained at the sums fixed in 1936 for five years of peace. Provided the war was not too prolonged the Council had hoped to have been able to continue throughout on that peace time basis. With the immediate reduction in work which followed the outbreak of war economies sufficient to meet initial rising costs were possible. With the continuance of the war that became increasingly difficult. Receipts from sales fell, increments due to members of the staff continued,

but, above all, the rise in costs directly attributable to the war became increasingly burdensome and, after an initial check, work in the bureaux began again to expand. In previous years a cost of living bonus had been introduced for lower grades in the Civil Service in the United Kingdom. In 1943–44, the amounts of this bonus were increased and its range extended to include all drawing salaries of £1,000 or less. The Council follows as far as possible the practices of the Civil Service of the country in which its officers are working. This meant that its staff also drew this bonus. No other course was either just or practicable. But under the extended scheme nearly every officer under the Council became entitled to this cost of living bonus. At the rates prevailing at the end of 1943–44 this charge increased current expenditure in the bureaux, excluding the Institutes, by £3,657 a year. Printing costs also rose steeply during the year. The British Commonwealth Scientific Conference of 1936 had estimated that for the eight bureaux then in existence an increase in income of £1,800 a year, of which the bureaux were to earn £600 a year by increased sales, would suffice for the forthcoming five years. This sum was clearly insufficient to meet the unexpected increases in cost due to the war. The Council accordingly placed the position before governments and asked for increased contributions for the bureaux with effect from 1st April, 1945, to meet those costs for which no provision could be made in 1936. The case of the Institutes was not quite so urgent, though their finances are being subject to the same kind of strain. At the time of writing this report replies have been received from most governments accepting these proposals.

Publications

6. Total receipts from sales of publications by both Institutes and all bureaux exceeded £10,000 for the first time. The previous best total had been £9,240 in the last year of peace, 1938–39.

	1937–38	1938–39	1939–40	1940–41	1941–42	1942–43	1943–44
	£	£	£	£	£	£	£
Imperial Institute of Entomology ..	2,779	2,444	2,037	1,798	1,885	1,692	2,236
Imperial Mycological Institute ..	961	1,092	904	670	843	799	1,333
The Bureaux, including Nutrition Abstracts and Reviews	5,068	5,704	5,910	5,247	6,443	5,468	6,607
	8,808	9,240	8,851	7,715	9,171	7,959	10,176

The figures for the several bureaux are as follows :—

	1937–38	1938–39	1939–40	1940–41	1941–42	1942–43	1943–44
	£	£	£	£	£	£	£
Soil Science	306	600	478	358	399	308	372
Animal Health	1,293	1,166	1,146	1,084	1,174	1,219	1,474
Animal Nutrition	29	25	21	29	50	45	38
Animal Breeding and Genetics ..	229	294	203	227	188	232	305
Horticulture and Plantation Crops ..	241	373	393	286	417	308	412
Pastures and Forage Crops	444	521	413	422	348	250	336
Plant Breeding and Genetics	258	314	406	320	334	240	342
Agricultural Parasitology (Helminthology)	364	316	228	224	198	236	247
Dairy Science	—	5	335	283	270	300	323
Forestry	—	3	202	195	237	229	236
Headquarters	2	17	19	22	16	7	5
Total	3,166	3,634	3,844	3,450	3,631	3,374	4,090
Nutrition Abstracts and Reviews ..	1,902	2,070	2,066	1,797	2,057	2,098	2,501
5-year Index	—	—	—	—	755	—4	16
	5,068	5,704	5,910	5,247	6,443	5,468	6,607

To some extent this increase was caused by purchases of back numbers by the Dutch Government and by purchases by the British Council for China and certain neutral and friendly countries. But for the most part pre-war subscribers in Europe and the Far East were still cut off and most of the increased sales were to Empire and English speaking countries. This increased demand for publications is partly due to a general revival of interest after the first shock of war. It is also directly due to the energy and initiative of Dr. Whyte, who, as officer in charge of the Central Sales Branch, has, in spite of war difficulties, striven to make bureaux publications better known in centres interested in agricultural research and, by centralizing sales, to make them easier to obtain. The sales of the publications of every institute and bureau were higher in 1943–44 than in 1942–43.

Receipts from the sales of publications by the Imperial Mycological Institute were higher than in any previous year in its history ; this was also the case with two of the bureaux, Animal Health and Animal Breeding and Genetics. Receipts from sales of Nutrition Abstracts and Reviews were substantially in advance of those of any previous year.

7. Seven Technical Communications were issued during the year ; viz.

	Issued by the Bureau of
The Mineralogy of Soil Colloids.	Soil Science.
Gestation Periods.	Animal Breeding and Genetics.
Propagation by Cuttings and Layers	Horticulture and Plantation Crops.
Photoperiodism in the Potato.	Plant Breeding and Genetics.
New and promising varieties of economic plants (5th List).	,, ,,
Production of Seed of root crops and vegetables.	Horticulture, Pastures, and Plant Breeding and Genetics.
Co-ordinated Trials with Phenothiazine against Nematodes in Lambs.	Animal Health and Agricultural Parasitology.

At the end of the year ten were in the Press or in preparation, viz.

Minerals in Pastures, Deficiencies and Excesses in relation to Animal Health.	Animal Nutrition.
Potato Collecting Expeditions in Mexico and S. America, Taxonomy and Systematic Classification of the Collection.	Plant Breeding and Genetics.
Bibliography of Insect Pest Resistance in Plants.	,, ,,
Artificial Insemination.	Animal Breeding and Genetics.
Co-operation in Forestry.	Forestry.
Modes of Spread of Streptococcus agalactiæ in Dairy Herds.	Animal Health.
Alternate Husbandry.	Pastures, Soil Science, Animal Breeding and Animal Genetics.
Imperata cylindrica : Its Economic Significance and Control.	Forestry and Pastures and Forage Crops.
Provision of Animal Fodder in Tropical and Subtropical Countries.	Pastures and Forage Crops.
Advances in Grassland Husbandry and Fodder Production.	,, ,,

The publication from the Bureau of Horticulture on Propagation by Layers and Cuttings has been much in demand ; also those on the Production of Seed of root crops and vegetables, Alternate Husbandry and Co-ordinated Trials with Phenothiazine against Nematodes in Lambs.

This last and the Modes of Spread of Streptococcus agalactiæ in Dairy Herds were prepared at the instance and under the supervision of the Agricultural Research Council of the United Kingdom and given to the bureaux—see last year's report.

8. Much helpful and greatly appreciated assistance, which has been further developed in 1944–45, was received from the British Council both in making bureaux publications available in countries with which contacts had been seriously broken by the war and in obtaining publications needed by the bureaux. In this last H.M. Stationery Office was also very helpful.

The Imperial Institute of Entomology

9. Each year as the war spread the number of subscribers to the Institute's publications fell. In 1943–44 for the first time since 1939–40 this fall was reversed. As compared with the previous

year subscribers to the Review Series A were 471 as against 447 ; to Series B 413 against 381 and to the Bulletin of Entomological Research 306 against 297.

Increased demands were also made on the information services of the Institute by Government Departments such as the Ministry of Supply, the Ministry of Food and the Middle East Supply Centre.

The number of insects received for identification, though still far below the numbers received pre-war, were more than twice as many as in 1942–43 viz. 29,073 as against 10,674. They were sent in by 88 correspondents. Lists of identifications despatched totalled 206 (109) comprising 2,904 (1,848) names. Of the specimens, 2,289, handed over to the British Museum, 72 were types new to science and 162 were named species not previously represented in the National Collection.

The Director's report is printed in Appendix I.

Imperial Parasite Service

10. Dr. Thompson's report is printed as Appendix III. Dr. E. Cameron continued work in the United Kingdom. A brief summary of his work is contained in Dr. Neave's report (Appendix I). Information on the different projects on which work was done or was in progress in North and South America is set out in Dr. Thompson's and Dr. Neave's reports. Since the middle of 1940 when Dr. Thompson was transferred to Canada the number of shipments made and insects shipped have been as follows :—

From the Imperial Parasite Service operating from Canada			By Dr. E. Cameron from the United Kingdom	
Financial year	No. of shipments	No. of insects shipped	No. of shipments	No. of insects shipped
1940–41	8	2,021	44	53,205
1941–42	69	739,242	3	2,359
1942–43	64	326,913	17	53,717
1943–44	59	91,496	21	156,837
Total ..	200	1,159,672	85	266,118

These totals are far below those, viz., 1,072 shipments and 39,284,688 insects in the six and a half years (October, 1933–March, 1940) before the war broke up the work at Farnham House Laboratory, but those were years of peace with an organization established and running, and since August, 1940, a new organization has had to be built up in America. They are, however, comparable with the figures, viz., 304 shipments with 1,851,668 insects in the first six and a half years (1927 to September, 1933) of the existence of Farnham House Laboratory. Numbers are not the sole, or necessarily the chief measure of this type of work. They may fluctuate enormously from year to year, according to the season or local circumstances. For instance, in 1941–42, one shipment consisted of 600,000 insects and in 1942–43 two were about 140,000 each. In 1943–44 the largest was 17,000. A safer criterion of this work is the number and variety of projects sent to the Parasite Service for execution. In this the record for 1943–44 was above pre-war experience. Dr. Thompson's report shows that one of his chief difficulties at times was shortage of trained staff. The general conclusion, if one can be drawn, is that interest in the possibilities of biological control has grown in the 17 years since the Laboratory was started and is likely to continue to grow.

11. If that be the case, then there is one type of information which the Parasite Service is always anxious to hear. One or two instances of it in Dr. Thompson's report encourage the hope that it may be forthcoming—i.e., what happens after the parasites are received. Knowledge of the condition in which they arrive is important and is usually forthcoming. But the information hoped for goes further than that. What effect have they had or are producing ? Admittedly this type of information is difficult to obtain. Unless some rather unusual and very spectacular result occurs it may be several seasons before it can be asserted with confidence that a parasite has established itself and is exercising a restraining influence. By that time other problems are attracting attention ; also, even if the pest has abated in severity, detailed field work and careful judgment are needed to decide the cause or causes. Yet, both

in the interests of their own work and for their own guidance as well as for the furtherance of scientific knowledge generally, the Parasite Service would be grateful for all such information, whether it records success or failure.

12. Dr. Cameron was retained for work in the United Kingdom. Although in 1943–44 he was busier than in the previous year the number of projects which have been sent for execution in the United Kingdom have been few. For 1944–45 hardly any have come forward. His retention for this work is not justified and he was asked, with regret, to find other employment. He was one of the early assistants at Farnham House and painstaking accuracy and careful field work have always characterized his work.

13. As interest in biological control grows the need for a properly cross referenced index to past literature increases. This should be supplied by the Parasite Catalogue, the first two parts of which appeared in 1943–44. Altogether 5 Parts are now (April, 1945) on sale covering references in literature between 1913 and 1937 to the parasites of the Arachnida, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isopoda, Isoptera, and part of the Lepidoptera. In these groups some 3,600 hosts and 4,800 parasites have been listed. The Council wishes once more to acknowledge the assistance given in checking names by the systematists in the Entomological Service at Ottawa and in the U.S. Bureau of Entomology.

The Imperial Mycological Institute

14. The Director's Report is printed in Appendix II. The most notable event in the year was the development in Medical Mycology. Following a recommendation of Lord Hankey's Committee, the Medical Research Council in the United Kingdom appointed a Committee, of which the Director of the Institute was a member, to consider the subject of research in medical mycology and the methods of supplying a service of information. Under the latter head the Institute in conjunction with Dr. Charles Wilcocks, Acting Director of the Bureau of Hygiene and Tropical Diseases, and Dr. J. T. Duncan brought out "An annotated bibliography of medical mycology for 1943." This will be continued. Thus through the co-operation of the two centres of information primarily interested—medical and mycological—a simple service of information adapted to the needs of research workers in this borderland subject of medical mycology has been started. The Council welcomes that type of co-operation between specialized centres of information.

15. The Dictionary of the Fungi by Dr. Ainsworth and Dr. Bisby was very favourably received when it appeared in the Autumn of 1943. A second edition will soon be issued as the first edition will be sold out.

Thirty-two more subscribers to the Review were enrolled in the year and more to the Supplements, i.e., Lists of new species of fungi described in the year. On the other hand subscribers to the maps shewing the distribution of plant diseases fell from 180 to 160.

The Herbarium was notably enriched by a collection of 1,450 Canadian specimens and one of 479 specimens from West Africa.

Finance and Accounts

16. The Comptroller and Auditor General has audited and certified the accounts of the Bureaux and of the Institutes for 1943–44. Copies are attached to this report. Those for the Imperial Parasite Service will be attached to the report for 1944–45.

17. Contributions due from governments and the amounts received within the year are as follows :—

	Due from Governments		Received in the year	Outstanding on 31.3.44
	Annual Normal	Outstanding on 31.3.43		
	£	£ s. d.	£ s. d.	£ s. d.
The Bureaux	27,800	583 19 9	28,780 0 8	396 0 11 (excess)
Imperial Institute of Entomology ..	13,442	771 0 10	13,813 0 10	400 0 0
Imperial Mycological Institute ..	7,900	487 5 1	7,807 5 1	580 0 0
Imperial Parasite Service	5,075	42 0 3	5,145 9 4	28 9 1 (excess)

All sums outstanding on the 31st March, 1943 (Column 2 above) were received during 1943–44.

On the 31st March, 1944, the Bureaux and the Imperial Parasite Service had received £396 0s. 11d. and £28 9s. 1d. respectively in excess of the amounts due in the year. These sums are the differences, in the case of the Bureaux, between payments in advance for 1944–45 of £461 15s. 7d. and 10s. usually overpaid by the Colonial Empire and outstandings £66 4s. 8d. due for 1943–44 and, in the case of the Parasite Service, of payments in advance for 1944–45 of £33 4s. 5d. and outstandings of £4 15s. 4d. The sums outstanding on the 31st March, 1944, viz., £66 4s. 8d. and £4 15s. 4d., as well as those of £44 and £580 due to the Institutes have all since been received.

18. Certain overpayments by the Colonial Empire in the years 1st April, 1937, to 31st March, 1942, were adjusted in the year by a refund from the bureaux of £189 19s. 6d. (vide the accounts).

19. In spite of an increase of £716 11s. 2d. in the receipts from sales of publications the net expenditure in the bureaux exceeded that in 1942–43 by £3,946 6s. 6d. The causes were those set out in paragraph 5. In the previous year contributions and miscellaneous receipts were insufficient to meet net expenditure and the difference had to be met from the balances to the credit of the bureaux. In 1943–44 these balances were again drawn upon to the extent of £4,431 6s. 6d. The prospect of these heavy increasing deficits was, of course, the reason for the application of an increase in contributions above their pre-war peace-time level (paragraph 5).

In each of the two Institutes, Entomology and Mycology, receipts covered outgoings in spite of increasing costs. Increased receipts from sales, exceeding £500 in each case, materially helped and in the case of the Mycological Institute was the chief reason. In the Institute of Entomology the main cause was that two officers, Dr. Taylor and Dr. Evans, who had been appointed to the posts of Senior Entomologists were, for war reasons, unable to join their appointments until 1944–45. Therefore these two senior posts were vacant throughout the year.

South American Potatoes

20. The summary given in the Annual Report for 1942–43 covered the period to the end of the growing season of 1943—i.e., about October, 1943. The following paragraphs bring the account up to the end of the calendar year 1944. In addition to information about the scientific work done and the number of tubers despatched to Empire countries the report for 1942–43 drew attention to the intense difficulty of accommodation arising from the need of taking greater precautions against virus infection. Plans had always been based on the assumption that many of the potatoes could straight away be grown in the open at Cambridge. Experience showed this was unsafe ; some South American species were affected by viruses prevalent at Cambridge, in some species a new virus was detected. Specimens infected with this new virus were destroyed. To prevent further risks of the spread of disease and the introduction of new diseases it was necessary to grow the collection in insect proof greenhouses. Varieties found clean could be multiplied in the open near Edinburgh which is very clear of aphis. This meant a re-casting of the whole scheme and the provision of insect proof glasshouses on a scale not previously contemplated. None were available in Cambridge. This was the major administrative difficulty during the latter half of 1943 and 1944. Governments were kept informed of the position. Unless the accommodation needed could be provided quickly the whole collection would in a short time be lost and work done upon it of no avail.

21. The difficulties of building at that time were great and costs were high. The Council had not the funds needed. The position seemed hopeless and, so it would have been but for the munificence of the Nuffield Foundation. They, through Professor Sir Frank Engledow, heard of the difficulty and asked for full information about the scheme, its economic potentialities and the immediate problems. As a result early in 1944 they offered to meet, up to £9,000, the cost of building at Cambridge five greenhouses with laboratory and other accommodation to enable the work to proceed. This sum, at that time, covered the full estimated cost of all buildings needed. Cambridge University provided without charge a site for the buildings on the University Farm which can be used for this Empire scheme as long as that is in progress. The Institute of Animal Genetics at Edinburgh University also gave valuable help. The vicinity of Edinburgh enjoys a high degree of freedom from these virus diseases. The Institute agreed that samples proved to be virus free could be grown on on their farm at Shothead near Edinburgh. Clean lines can thereby be multiplied in the open.

22. Scientific opinion is unanimous that if potatoes are to be bred possessing resistance to common diseases and to frost or suitable to tropical conditions the qualities desired must be sought in South American varieties. The collection at Cambridge made at the instance of the Empire

Governments is the most representative in the world. That it will be preserved and facilities provided for scientific investigation thereon is entirely due to the generosity of the Trustees of the Nuffield Foundation, and, that lead having been obtained, to the help given by Cambridge and Edinburgh. The Agricultural Departments in the Empire, and it is hoped through them in the years to come potato growers in Empire countries, are under a great obligation to the Nuffield Trustees.

23. Practical difficulties of building in 1944 were not, however, over. After investigation of all the circumstances, permission for material and building was given by H.M. Office of Works provided the immediate expenditure was kept within £5,000. Without that permission nothing could be done. This limit of expenditure caused a further revision of plans. The first requisite was insect proof greenhouses so as to be able to grow the potatoes under control. By concentrating on those and the preparation of the site and leaving for some future date the construction of the laboratory and working buildings the cost could be kept within the limit imposed by the Government. This curtailment will make the conduct of work difficult and inconvenient for the time being and will raise the cost of providing all the accommodation needed above the £9,000 given by the Nuffield Trustees. This excess will fall on the funds provided by Governments for work on these South American potatoes, but the limit of £5,000 was one being generally enforced on buildings the erection of which had been approved. The Council is deeply conscious of the help it has received from every side when faced with an unexpected and apparently insoluble difficulty.

24. The plans were prepared and the building work supervised by the Architect to Cambridge University who looks after all the buildings for the School of Agriculture there. Work proceeded during 1944, and the greenhouses will be ready for occupation in the growing season of 1945. Meanwhile, varieties which had been proved virus free were grown in Edinburgh in 1944. With those which still had to be grown at Cambridge every effort was made to keep virus infection to a minimum.

Work on the Collection

25. The previous year's report gave details of the distribution up to 31st March, 1943, and an account of the scientific work on the collection up to the autumn of 1943. In Appendix IV information under both these heads is brought up to 31st December, 1944. An attempt will be made in future reports to cover the work done on the collection to the end of each calendar year.

26. (*a*) *The Collection*

Distribution of samples was restricted by difficulties of transport and the need for ensuring that those despatched were free from virus. Between 1st April, 1943, and 31st December, 1944, 646 tubers representing 286 varieties and 73 seed samples were despatched to Empire countries overseas.

Four hundred and eighty-three tubers representing 162 varieties were received from South America during this period.

(*b*) *Scientific Work*

The account given in Appendix IV sets out the lines on which work was in progress and summarizes the work done. This examination extends and substantiates that of previous years. It indicates that many samples possess physiological properties much to be desired in commercial varieties. It also shews the assistance which is being given by specialist research stations, the Potato Virus, the Low Temperature Research Stations and the Dunn Biochemical Laboratory all at Cambridge, the Plant Pathological Laboratory at Harpenden, the Institute of Agricultural Parasitology and King's College, Newcastle-on-Tyne.

In providing virus free material for many of these examinations and test, as well as for despatch overseas, the field plots at Edinburgh were very useful.

Finance of the Collection

27. In the Annual Report for 1942–43 it was reported that all contributions from Governments due up to 31st March, 1943, had been received by that date. The total sum due in the financial year 1943–44 was £4,100, all of which was received within that year.

The difficulties caused by the occurrence of virus and the uncertainty about accommodation (vide above) delayed the development of the scientific work on the lines originally contemplated. It was clearly useless to embark on extended plant breeding when the immediate fate of the collection itself was in the balance. The result was underspending in this year. The year closed with a credit balance of £5,528 6s. 4d. This sum will be needed as work in the new buildings becomes possible and also to meet any ultimate excess on building costs over the £9,000 provided by the Nuffield Trustees (paragraph 23 above).

The Research Schemes

28. Two Governments, those of New Zealand and Southern Rhodesia, contribute to the Low Temperature Research conducted under the Department of Scientific and Industrial Research. The sums due in the year, viz., £500 and £50 were received and paid to the Department.

Three Governments, those of Australia, New Zealand and the Union of South Africa, contribute through the Council to the Wool Industries Research Association for the work at Torridon, Leeds. The sums due in the year, viz., £1,000, £50 and £400 were received and paid to the Association.

GERALD CREASY,

Chairman.

THE EXECUTIVE COUNCIL OF THE IMPERIAL AGRICULTURAL BUREAUX

ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1944.

RECEIPTS.

	£ s. d.	£ s. d.
Balance on 1st April, 1943 (*a*)		329 7 8
Balance on deposit with Post Office Savings Bank on 1st April, 1943 (*a*) ..		8,353 16 4
Contributions from Governments of the Empire and Sudan :—		
(*a*) Imperial Agricultural Bureaux		28,780 0 8
(*b*) Various Institutes	13,245 9 4	
Less : Paid over	12,745 9 4	
		500 0 0
(*c*) Potato Expedition Fund		4,100 0 0
Contributions by Institutes towards cost of Headquarters		325 0 0
Miscellaneous Receipts :—		
(*a*) Interest and Dividends		498 3 2
(*b*) Translation Fees ..		48 16 6
		£42,935 4 4

(*a*) Includes sums held on behalf of :—
Potato Expedition Fund .. £3,574 16 2
Journal of Dairy Research 100 0 0

I have examined the above Account. I have obtained all the information and explanations that I have required and I certify, as the result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. UPCOTT,
Comptroller and Auditor General.

PAYMENTS.

	Expenditure £ s. d.	Less Receipts for Sale of Publications, etc. £ s. d.	Net Expenditure. £ s. d.
Expenditure incurred by the Imperial Bureau of :—			
Soil Science (Rothamsted)	2,890 15 1	371 10 11	2,519 4 2
Animal Health (Weybridge) ..	6,556 7 6	1,473 15 6	5,082 12 0
Animal Nutrition (Aberdeen) ..	3,691 1 6	38 4 10	3,652 16 8
Animal Breeding and Genetics (Edinburgh)	2,860 13 1	305 15 4	2,554 17 9
Pastures and Forage Crops (Aberystwyth)	4,383 15 9	335 19 9	4,047 16 0
Plant Breeding and Genetics (Cambridge)	4,203 11 7	341 18 7	3,861 13 0
Horticulture and Plantation Crops (East Malling)	3,024 9 7	411 18 10	2,612 10 9
Agricultural Parasitology (St. Albans)	2,069 5 5	246 16 10	1,822 8 7
Dairy Science (Shinfield)	2,079 1 10	323 3 9	1,755 18 1
Forestry (Oxford)	2,895 9 7	236 9 1	2,659 0 6
Secretariat	3,329 6 2	4 16 4	3,324 9 10
	37,983 17 1	4,090 9 9	33,893 7 4
Refunds to Colonial Governments of Excess Contributions received during period 1st April, 1937 to 31st March, 1942			189 19 6
Potato Expedition Fund			2,146 9 10
Balance on 31st March, 1944.			
H.M. Paymaster General ..	6,532 19 10		
Less : Outstanding Orders ..	2,816 13 8		
	3,716 6 2		
Less : Sub-Accountants and Deposit Accounts ..	162 18 0		
	3,553 8 2		
Post Office Savings Bank	3,151 19 6		
			(*b*) 6,705 7 8
			£42,935 4 4

Investments at 31st March, 1944.

£4,000 5% Conversion Loan 1944/64 at cost	4,152 16 0
£2,000 4% Commonwealth of Australia regd. stock 1955/70 at cost	1,940 4 0
£4,000 3% ,, ,, ,, ,, ,, 1939/44 at cost	3,959 14 6

(*b*) Includes sums held on behalf of :—

Potato Expedition Fund ..	5,528 6 4
Journal of Dairy Research ..	100 0 0

(Signed) W. G. IVES,
Accountant to Council.

(Signed) DAVID CHADWICK,
Secretary.
Executive Council, Imperial Agricultural Bureaux.

IMPERIAL INSTITUTE OF ENTOMOLOGY

Account of Receipts and Payments for the Year ended 31st March, 1944.

RECEIPTS.	£	s.	d.	£	s.	d.
Balance on 1st April, 1943				8,638	15	11
Contributions from :—						
Empire Governments ..	13,813	0	10			
Foreign Governments ..	375	0	0			
Societies	150	0	0			
				14,338	0	10
Interest and Dividends ..				534	15	4
Sales of Publications ..				2,236	8	5
Special Projects : *Parasite Work*						
Grants received	295	15	0			
Less Expenditure directly chargeable thereto ..	197	5	9			
				98	9	3
				£25,846	9	9

PAYMENTS.	£	s.	d.
Salaries, Director, etc.	1,433	0	0
F.S.S.U. contributions	140	0	0
Salaries, Scientific Staff	8,291	7	8
F.S.S.U. contributions	841	0	0
Salaries, whole-time staff	2,296	15	9
F.S.S.U. contributions	181	9	1
National Insurance	40	7	10
Travelling expenses		3	6
Library : Books, Publications, Binding, etc.	119	8	9
Bulletins	1,179	2	3
Stationery, Postages, Telephones, etc.	103	9	5
Rent, Rates, Insurance	375	13	2
Housekeeping, Light, Heat, Water, Cleaning, etc.	258	4	5
Laboratory Equipment	51	13	11
Contingencies	12	16	0
Audit Fee and contribution towards Headquarters	250	0	0
			15,574 11 9
Balance on 31st March, 1944.	£	s.	d.
Joint Colonial Fund	9,000	0	0
Crown Agents for the Colonies	967	9	7
Dr. S. A. Neave	13	2	1
Dr. E. Cameron	17	7	1
	9,997	18	9
Add : F.S.S.U. Suspense	273	19	3
			10,271 18 0
			£25,846 9 9

(Signed) W. G. IVES,
Accountant to Council.

(Signed) S. A. NEAVE,
Director.

Investments on 31st March, 1944.				£	s.	d.
£1,040 5 2	Queensland	1922/47	Stock 3% at cost	1,000	0	0
£1,000 0 0	Cyprus	1956/66	,, 4% ,,	950	0	0
£2,679 19 0	Funding	1960/90	,, 4% ,,	1,869	12	6
£1,000 0 0	Jamaica	1952/62	,, 4% ,,	940	0	0
£1,017 16 8	Kenya	1961/71	,, 4½% ,,	998	15	0
£1,000 0 0	India	1950/55	,, 4½% ,,	936	7	0
£1,000 0 0	Nigeria	1963	,, 4% ,,	881	7	0
£8,738 0 10				£7,576	1	6

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as the result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. UPCOTT,
Comptroller and Auditor General.

(Signed) DAVID CHADWICK,
Secretary,
Executive Council, Imperial Agricultural Bureaux. 21.6.44.

IMPERIAL MYCOLOGICAL INSTITUTE, KEW, SURREY

ACCOUNT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH, 1944.

RECEIPTS.

	£	s.	d.	£	s.	d.
Balance on 1st April, 1943				7,078	0	6
Contributions :						
Empire Governments	7,807	5	1			
Sudan	125	0	0			
Imperial Chemical Industries	50	0	0			
				7,982	5	1
Dividends and Interest				223	10	7
Publications				1,332	18	6
				£16,616	14	8

PAYMENTS.

	£	s.	d.
Director's salary	1,200	0	0
Superannuation	120	0	0
Scientific and Technical Staff Salaries	4,196	14	11
Superannuation	399	0	0
Clerical Staff Salaries	503	8	1
Superannuation	62	12	0
Laboratory Attendant	256	19	8
Superannuation	20	3	0
Part-time and Overtime	15	18	10
National Insurances	20	13	8
Travelling	6	2	9
Library	52	0	10
Publications	1,241	7	9
Postage, Telephone, Stationery, etc.	110	4	6
Rent, Rates and Insurance	115	18	8
Light, Heat, Water, Cleaning	252	15	10
Laboratory Apparatus	46	16	4
Contingencies	24	11	0
Audit and Contribution to Headquarters	120	0	0
	8,765	7	10

Balance on 31st March, 1944.	£	s.	d.			
Joint Colonial Fund	7,000	0	0			
Crown Agents	127	1	3			
Bank	610	14	11			
Petty Cash	4	5	3			
Stamps	5	6	10			
F.S.S.U. Suspense Account	104	5	9			
	7,851	14	0			
Less : Income Tax Suspense		7	2			
				7,851	6	10
				£16,616	14	8

(Signed) W. G. IVES,
Accountant to Council.

(Signed) S. P. WILTSHIRE,
Director.

Investments at 31st March, 1944.
£2,077 15s. 4d. New Zealand 3½% 1960–1964.

I have examined the above Account. I have obtained all the information and explanations that I have required, and I certify, as a result of my audit, that in my opinion the above Account is correct.

(Signed) G. C. UPCOTT,
Comptroller and Auditor General.

(Signed) DAVID CHADWICK,
Secretary,
Executive Council, Imperial Agricultural Bureaux.
21.6.44.

APPENDIX I

IMPERIAL INSTITUTE OF ENTOMOLOGY

DIRECTOR'S REPORT FOR 1943-44

The interference in the Institute's work caused by the war has passed its zenith. In 1943–44 there was a significant increase in demands for assistance in the identification of specimens and for the Institute's publications.

Increased demands on the information service of the Institute were also made. Numerous requests were received from the Government Services both at home and in the Empire, including the Ministry of Supply, Ministry of Food, the Middle East Supply Centre and the Government of Malta, as well as from commercial firms and private individuals.

Staff

Dr. W. J. Hall, M.C., D.Sc. (formerly Entomologist and Director, British South Africa Company's Citrus Experimental Station, Mazoë, Southern Rhodesia), joined the staff on 1st April, 1943, as Senior Entomologist. He is a specialist on the Coccids and Aphids.

Mr. P. J. Newby (Assistant Preparator) was called to the Forces on the 14th April, 1943, and Mr. A. W. McAusland (Junior Clerk) on the 6th October, 1943.

Mr. L. A. Tillin (Clerk), who had been in the Army since the outbreak of War in September, 1939, and was serving in Iran was seconded by the Army towards the end of 1943 for special work in connection with locust investigations in Persia.

Identification of Insects

During the year under review the number of specimens received was 29,073, as compared with 10,674 in the previous year. These insects were sent by 88 (65) different correspondents, who were geographically distributed as follows :—Africa 14 (18), America 5 (5), Asia 4 (6), Oceania 1 (3), Europe 64 (33) ; the numbers in brackets being those for the previous year.

The lists of identifications sent out totalled 206 (109) comprising 2,904 (1,848) names. The numbers of identifications sent to the various Dominions, Colonies and other territories are as follows :—

AFRICA :				
Union of South Africa	81	(70)		
Southern Rhodesia	30	(130)		
Sudan	125	(26)		
Gold Coast	76	(23)		
Kenya	552	(264)		
Nigeria	62	(93)		
Nyasaland	35	(95)		
Sierra Leone	7	(21)		
Tanganyika Territory	18	(5)		
Uganda	72	(253)		
Other Territories	823	(231)		
			1,881	(1,211)
AMERICA :				
Canada	—	(6)		
West Indies	57	(6)		
Other Territories	51	(—)		
			108	(12)
ASIA :				
India and Burma	125	(64)		
Ceylon	3	(—)		
Cyprus	—	(—)		
Malaya	—	(—)		
Palestine	27	(28)		
Other Territories	41	(15)		
			196	(107)
OCEANIA :				
Australia and New Guinea	12	(170)		
New Zealand	3	(10)		
Fiji Islands	248	(201)		
Solomon Islands	28	(35)		
Other Islands	—	(11)		
			291	(427)
EUROPE :				
United Kingdom	423	(83)		
Other Countries	5	(8)		
			428	(91)

In addition to the named specimens which are returned to the senders, 2,289 (1,850) insects have been handed over to the British Museum, of which 72 (50) were types of species new to science, and among the remainder 162 (37) named species not previously represented in the National Collection.

During the year 26 papers (643 pages) on insect taxonomy have been published by 5 members of the staff.

Work on Parasites

Dr. E. Cameron continued to carry on the parasite work for the Institute in this country. The chief projects receiving his attention were the Cabbage Butterfly (*Pieris rapæ*) and its parasites, particularly *Apanteles rubecula*, on behalf of Australia ; and the Pine-shoot Moth (*Rhyacionia buoliana*) and its several parasites, on behalf of Canada. Subsidiary projects were, the Codling Moth (*Carpocapsa pomonella*) for Canada, the Ragwort Seed-fly (*Pegohylemyia seneciella*) of Australian interest, the Pine Resin-gall Tortrix (*Rhyacionia resinella*) of Canadian interest, and the Turnip Seed-Weevil (*Ceuthorrhynchus assimilis*), for Canada. No collection of the last named species was made, as the season was too far advanced when the request for its parasites was received. Considerable preliminary ground-work has been done on the project.

During the year approximately 157,000 beneficial insects were despatched to the Dominions as compared with 53,000 in the preceding year.

" Review of Applied Entomology "

The 31st (1943) volumes of the two Series of the " Review of Applied Entomology " comprises 776 pages as against 812 (1942), and contained 1,831 abstracts and titles as against 1,677 (1942). This volume is the first complete one to be printed in the new and more economical format, to which attention was drawn last year.

Since 1939–40 the number of subscribers to the Institute's journals had fallen each year. In 1943–44 the number rose for the first time since 1939–40. The increase was small but is becoming more marked in 1944–45.

The subscribers to Series A increased from 447 (1942) to 471 (1943), and those to Series B from 381 (1942) to 413 (1943). The total cash receipts for the calendar year were £1,278 3s. 10d. as compared with £1,131 8s. 3d. for 1942.

" Bulletin of Entomological Research "

The 34th volume of this journal comprised 328 pages as against 284 in the previous volume. It contained 27 papers illustrated by numerous text figures.

The number of subscribers rose from 297 to 306. Sales of back numbers increased by £90. Reprints brought in £132 due to a large order from the Ministry of Food.

Total cash receipts for the calendar year 1943 amounted to £704 7s. 3d. as against £568 14s. 4d. for 1942.

" Zoological Record, Part Insecta," Vol. 79 (1942)

This volume was issued in July, 1943. The net profit to the Institute for the calendar year 1943 was £32 13s. 11d. as against £31 10s. 1d. for 1942.

The annual contribution of £100 to the Institute was made out of the " Zoological Record Fund " towards the cost of preparation.

Other Publications

Sales included 12 copies of " Locusts and Grasshoppers," 8 of " Biological Control of an Insect in Fiji " and 3 of " The Coconut Moth in Fiji."

Net cash received during 1943 amounted to £19 4s. 9d.

Locust Investigations, 1943-44*

The Anti-Locust Research Centre was busily concerned throughout the year in the extensive campaign against the Desert Locust (*Schistocerca gregaria*) which was organized on an international scale throughout the Middle East and East Africa. Dr. B. P. Uvarov attended conferences of experts held in North and East Africa and the Middle East in connection with the organization of the campaign. The locust information service has developed to a stage when regular cable reports are received at the Centre and monthly bulletins, with forecasts, are issued. Special field trials, on a large scale, using aircraft have been carried out, and tests made of several new poisons.

Library

Accessions during the year numbered 199 (149) volumes and 553 (684) pamphlets. The Library now contains 11,013 volumes and 29,722 pamphlets. Parts of 373 (325) serial publications were received. Loans, many of which were to Government Departments, were by far the highest on record, numbering 1,072 (914). Enquiries on very varied subjects were dealt with on behalf of a large number of visitors, including those from Government Departments and members of the Allied Fighting Forces.

The catalogue of serial and official publications has been kept up-to-date. Owing to staff shortage, arrears in cataloguing have increased to 2,932 volumes; the author catalogue is nevertheless approximately 80 per cent. complete.

Co-operation between the Library and those of the Bureaux has increased considerably during the past year, due partly to such war-time measures as the Imperial Agricultural Bureaux Accessions List of Foreign Publications.

S. A. NEAVE,
Director.

* This work is not under the control of the Executive Council, but of the Interdepartmental Committee on Locust Control at the Colonial Office.

APPENDIX II

IMPERIAL MYCOLOGICAL INSTITUTE

DIRECTOR'S REPORT FOR 1943-44

During the year under review the work of the Institute increased very appreciably, partly owing to the favourable developments in the war and partly to collaboration with the Ministry of Food and the Ministry of Supply in certain problems arising out of the war.

Investigation Work

Supplements 7 and 8 to the *Review of Applied Mycology*, recording new species of fungi, were compiled and issued during the year.

The Director delivered his Presidential Address to the British Mycological Society on " The organization of the study of systematic mycology " in December, 1943 and this has since appeared in the *Trans. Brit. mycol. Soc.*, xxvii, p. 1–12, 1944.

Major Dade has continued his work on the moulding of stored foodstuffs on behalf of the Ministry of Food. Seventy cases were examined and the fungi concerned identified. In many instances recommendations were made for arresting the damage or improving storage conditions.

Some cases of hive moulds in relation to bee diseases were examined by Major Dade who recorded *Pericystis apis* Maassen on a solitary bee for the first time in a letter to *Nature*, cliii, p. 112, January 22nd, 1944.

Major Dade published a paper entitled " Colour terminology in biology " as *Mycological Paper No.* 6, issued by the Institute. Considerable interest has been aroused by this paper and it is to be hoped that the standardization of colour names proposed in extension of Ridgway's system will be generally adopted by mycologists and others.

With the increased interest being shown in medical fungi, an enquiry was commenced by Mr. Mason into the identity of the genus *Monilia*, which is used by plant pathologists and medical mycologists in two entirely different senses. On reviewing the bibliographic status of the name Mr. Mason found that the history of *Monilia* was entangled with that of *Torula*, and that before a clear account of the former can be given more information must be obtained regarding the earlier species of the latter. The species best known as *T. epizoa* was received about a dozen times on war-time food and its study in collaboration with Major Dade proved it to be a key species in Vuillemin's classification of the Hyphomycetes. Interesting data are being collected about other relevant species of *Torula* and it is hoped that a full account of this work will be published in due course.

Mr. Mason wrote a brief obituary notice of the late Sir Edwin Butler, the distinguished Director of this Institute from 1922 to 1935, for *Nature* (cli, p. 552, 1943) and a much fuller one for the Royal Society (*Obituary Notices of Fellows of The Royal Society*, vol. 4, pp. 455–474, November, 1943). The latter included an account of the origin and of the first seventeen years of the Institute.

The Dictionary of the fungi compiled by Dr. Bisby and Dr. Ainsworth was published by the Institute on 23rd September, 1943. It comprised viii + 359 pp. with 138 figures. Reviews of the book have appeared in a number of scientific periodicals and have been generally favourable. Sales have been much more rapid than expected and there is no doubt that a book of this sort was badly needed. A second edition will be required in the near future. It is to be hoped that this publication will constitute a feature of the work of this Institute, that it will be continually revised and kept up-to-date, and its usefulness constantly maintained.

As convenor of a sub-committee of the British Mycological Society Dr. Bisby helped to prepare and see through the Press a " List of Common British Plant Diseases."

Dr. Bisby published the following papers during the year: "Geographical distribution of fungi."—*Botan. Review*, ix, pp. 466–482, July, 1943: "Stachybotrys"—*Trans. Brit. mycol. Soc.*, xxvi, pp. 133–143, January, 1944; and in collaboration with Dr. G. C. Ainsworth, "The numbers of fungi"—*Trans. Brit. mycol. Soc.*, xxvi, pp. 16–19, April, 1943.

Dr. Bisby also prepared a list of "The genera of Uredinales with citations" which has since been issued by the Institute as Mimeographed Publication No. 2.

Dr. Ainsworth in addition to the joint publications with Dr. Bisby already mentioned, published a note on "Virus nomenclature" in the *Ann. appl. Biol.*, xxx, 2, pp. 187–188, 1943. He has also assisted in the preparation of a "List of virus names used in the *Review of Applied Mycology*" referred to below.

Dr. Ainsworth has continued his studies of the Ustilaginales. In collaboration with Miss Sampson of Aberystwyth he has started to monograph the British smuts.

Identification Work

Specimens and cultures received during the year included a number of interesting fungi from germinating seed from Canada, *inter alia Petriella asymmetrica*, and species of *Cladosporium*, *Alternaria*, *Trichoderma*, *Curvularia* and *Periconia*; entomogenous fungi from South Africa; fungi from diseased *Casuarina* from India; moulds on typewriter ribbons from India; a new British fungus, *Strasseria*, on apple from Scotland; *Rhizoctonia* on cereals in England; an undescribed fungus on banana from Jamaica; *Byssochlamys nivea* on cheese from South Africa; and what is claimed as the pycnidia of *Rhizoctonia lamellifera* also from South Africa.

Major Dade checked 97 cultures of *Aspergillus* from the National Collection of Type Cultures, Lister Institute, at the request of the Curator. Eleven cultures of species of this genus from the Hannah Research Institute were examined and their identity confirmed, and a few other isolates of this genus were also received for various clients. Cultures were also supplied in connexion with the extraction of bacteriostatic substances and for the production of citric acid.

A number of additions to the Herbarium were made during the year including notably 1450 Canadian specimens purchased from Dr. Bisby. Some 479 specimens of West African fungi were sent to Mr. C. G. Hansford, Uganda, for study.

Mr. Deighton, Sierra Leone, worked at the Institute during the early part of 1943 and his Mss. on "The Meliolineæ of West Africa" was prepared for publication largely with the help of Mr. Mason, who also saw Mr. Hansford's "Contribution V: Fungi imperfecti" through the press. A similar service was performed by the Institute staff in connexion with certain other papers.

Information Service

Volume xxii of the *Review of Applied Mycology* and the Index to vol. xxi were published. The cost of printing and distributing the *Review* and Supplements 6 and 7 amounted to £738 15s. 10d. and £30 9s. 6d., respectively, and the receipts from sales to £1,032 18s. 8d. The distribution of the *Review* in December, 1943 rose to 752 copies (including 512 subscribers) and that of the *Supplement* to 101 (94 subscribers). The number of papers abstracted during the year was 1,300 compared with 1,300 in 1942 and the volume totalled 512 pages (with an enlarged type page to save paper) excluding the index.

The revision of the subject catalogue of phytopathological papers was continued.

During the year 24 distribution maps of plant diseases were issued, the number of subscribers at the end of 1943 numbering 160. Receipts from sales amounted to £35 2s. 1d.

From 1925 onwards, Mr. Mason has published a series of valuable "Annotated accounts of fungi received at the Imperial Mycological Institute." This somewhat clumsy title has been awkward to cite and called for a more convenient name. At the same time the difficulty has been experienced in obtaining publication of important research papers submitted to the Institute by overseas mycologists. Accordingly it was decided to adopt the name "Mycological Papers" for this series, numbering Mr. Mason's contributions Nos. 1 to 5. During the year under review three Mycological Papers were issued, No. 6 being Major Dade's paper on "Colour terminology in biology" referred to above; No. 7 "Notes on India Fungi I" by G. Watts Padwick and J. L. Merh; and No. 8, "A preliminary list of plant diseases in Jamaica" by L. N. H. Larter and E. B. Martyn. The publication of these papers by the Institute has facilitated our work and has been appreciated by our clients overseas. It is to be hoped that support for the enterprise will be forthcoming. The receipts from sales during 1943–4 amounted to £35 15s. 7d.

Of the 755 copies of the Dictionary of the fungi printed, only 324 were left at the end of March, 1944, rather more than six months after publication.

Further progress was made in the standardization of the common names of virus diseases during the year. The revised and enlarged list of common names incorporating the amendments suggested by various collaborators was duly published in mimeographed form under the title "Virus names used in the *Review of Applied Mycology*" in January, 1944. A number of copies were distributed among virus workers throughout the world and have called forth encouraging comments and valuable criticisms. The joint Plant Pathology Committee of the British Mycological Society and the Association of Applied Biologists is now examining the list with a view to its adoption in revised form. It is hoped that a printed edition will be issued in due course.

Arising out of the recommendations of Lord Hankey's Committee the Medical Research Council appointed a committee of five to consider the provision of research in medical mycology. It unanimously recommended the formation of a research committee for the subject. The Medical Research Council thereupon appointed a larger committee of twelve to examine the situation further. This committee also recommended the more intensive study of the subject and stressed the need for better dissemination of information. A Committee on Research in Medical Mycology was thereupon appointed by the Medical Research Council comprising both medical men and mycologists. For over twenty years the *Review of Applied Mycology* has abstracted papers in this subject but there is little doubt that few medical men were acquainted with this. In collaboration with Dr. Charles Wilcocks, Acting Director of the Bureau of Hygiene and Tropical Diseases and Dr. J. T. Duncan of the London School of Hygiene and Tropical Medicine, "An annotated bibliography of medical mycology for 1943" was prepared for publication. This bibliography aims at covering the field completely and provides either annotations or references to published abstracts of the literature on medical mycology. The undertaking received the cordial support of the Committee.

Library

About 100 books and reprints have been sent out on loan during the year. In some cases where the publication was not available for lending, microfilms have been supplied. Two lists of surplus publications available for distribution have been prepared and circulated to Bureaux and other

agricultural institutions and a number of requests for these papers were received.

Miscellaneous

Apart from the considerable time given to the examination of samples of moulded foodstuffs received from the Ministry of Food, the Institute has been assisting in certain investigations in connexion with the war, undertaken in the first instance at the request of the Canadian Government and later the Ministry of Supply.

Lady Butler generously presented a crayon portrait of the late Sir Edwin Butler and his microscope to the Institute.

Staff

There has been no changes in staff during the year. Voluntary clerical assistance enabled the Institute to maintain its work without increasing the reduced clerical staff.

S. P. WILTSHIRE,
Director.

APPENDIX III

REPORT FOR 1943-44

by

Dr. W. R. THOMPSON

Assistant Director, Imperial Institute of Entomology, Director, Imperial Parasite Service

The following is a summary of the work carried out by the Imperial Parasite Service during the financial year beginning 1st April, 1943, and ending 31st March, 1944.

Collection and Shipment of Parasites

Deciduous Fruit Insects

Codling Moth (*Carpocapsa pomonella* L.)

In the early part of 1943, stocks of *Ephialtes caudatus* and *Cryptus sexannulatus* Grav., two European parasites of the Codling Moth originally collected by the Imperial Parasite Service in Southern France, were supplied to the Parasite Laboratory of the U.S. Bureau of Entomology in Hoboken, N.J., at the request of Dr. C. P. Clausen. These stocks proved insufficient for breeding work. A further consignment, consisting of 63 coccoons of *Cryptus* and 276 cocoons of *Ephialtes* was therefore despatched on May 31 and was received in excellent condition at Hoboken.

During the late summer and winter months, through the help of Mr. J. C. F. Fryer, Dr. A. M. Massee and others, collections of hibernating Codling Moth larvæ were made in Great Britain. In all, 5 consignments of these larvæ, comprising approximately 14,000 specimens, were shipped by Dr. E. Cameron from Great Britain. These were transferred to the Belleville Laboratory for the rearing of parasites.

Forest and Shade-tree Insects

Lantern Flies (*Ormenis* spp.)

The Plant Pathologist of Bermuda asked for information about parasites of the Fulgorid, or Lantern Fly, *Ormenis infuscata* Stal, which is very injurious to cedar (*Juniperus bermudiana* L.) in Bermuda. A list of the recorded parasites was forwarded to him. An expenditure of £100 was authorised by the Department of Agriculture of Bermuda, to cover the cost of an investigation. A search was made for the various stages of Ormenis, both in the Belleville region and near Ottawa, where officers of the systematic unit revisited localities in which the Fulgorids had previously been collected. However, no material was discovered.

Spruce Budworm (*Archips fumiferana* Clem.)

Owing to severe infestations of the Spruce Budworm, particularly on Balsam, in Canada, attention has been given to the possibility of the biological control of this pest.

Lists of the parasites known to attack the European *Tortrix murinana* Hb. and *Tortrix histrionana* Froel., the closest known allies of the Spruce Budworm, were compiled from the Parasite Catalogue. The alternate hosts of the parasites of these species were also listed and the records of their habits studied. It was found that a number of the parasites of *murinana* and *histrionana* also attack British Lepidoptera and could be collected for experimental colonisation if this seems desirable. Memoranda on the subject were supplied to Mr. Baird and Mr. de Gryse of the Canadian Division of Entomology.

Consideration was also given to the possibility of obtaining parasites useful from New Zealand, since authorities on the Lepidoptera had referred the insect to the genus Harmologa, which is peculiar to New Zealand and near-by regions. Dr. David Miller, Chief Entomologist of New Zealand, very kindly offered to co-operate in the work. Further enquiries showed, however, that the best modern authorities do not consider the Budworm to be a Harmologa, so the project was abandoned.

Since the Budworm is an insect native to North America, the most promising method of biological control appears to be to transfer efficient parasites now found only in certain parts of the range of the insect, to infested areas where they are absent.

Accordingly Mr. W. F. Sellers visited several Laboratories of the United States Bureau of Entomology on his way to California. The information he collected about Budworm infestations, host plants and parasites, was passed to Mr. de Gryse and Mr. Baird. He also arranged with Mr. N. D. Wygant, of the U.S. Bureau of Entomology, the Forest Insect Laboratory, Fort Collins, Colorado, for the despatch of three collections of Spruce Budworm material. These were received in good condition in Belleville.

Early in June, the Director with Mr. Baird and Dr. A. Wilkes, visited infested areas in Algonquin Park, at Angus and at Midhurst, and collected samples of parasites for rearing.

Pine Shoot Moth (*Rhyacionia buoliana* Schiff.)

Early in the financial year officers of the Canadian Entomological Service asked for parasites of the Pine Shoot Moth. This request was transmitted to Dr. E. Cameron, in Great Britain. Though it was rather late in the season, Dr. Cameron succeeded in sending three consignments, estimated to contain about 6,000 specimens of the Pine Shoot Moth. These were sent by air and arrived in excellent condition. Over 3,000 parasites belonging to

5 species were reared from the material. Most of these were liberated in the field though some were retained for breeding in the laboratory.

Pine Browntail (*Euproctis terminalis*)

The consignments of Compsilura concinnata shipped to South Africa by air in 1942, for use against the caterpillar of the Pine Browntail Moth, an injurious pest of plantations of imported pines in the Union, failed to produce adults, owing to delay and damage en route. At the request of the Chief Entomologist of South Africa arrangements were made for further collections. Reports indicated that the severe winter of 1942/43 had considerably reduced the populations of the Browntail and Gipsy Moths. In a preliminary inspection through the New England States during the first week of May Mr. W. F. Sellers found that winter kill of Browntail larvæ in winter nests and Gipsy Moth eggs, in Maine and New Hampshire was too extensive to allow of satisfactory collections. He thought, however, that a sufficient amount of material could be collected in Southern Massachusetts. The work was assigned to Mr. W. S. McLeod but he accepted a post offered to him by the University of Manitoba. As no other trained assistant could be secured, the work of collection was assigned to Mr. F. J. Simmonds and Mr. R. C. Jeffery, who left for New England on June 15th. Working quarters were established with the help of the officers of the U.S. Department of Agriculture and of the State of Massachusetts, in the Freetown State Forest. Collections were begun immediately and in one week, a total of 63,000 larvæ of the Gipsy Moth were gathered. However, an unexpected warm period in the early part of June had accelerated the development of host and parasites and when the workers arrived on the scene, it was too late to carry out adequate scouting operations. In the area selected, parasitism by Compsilura proved to be low. A total of 1,048 puparia was obtained. The first consignment, comprising 127 specimens, was taken to Washington on June 25th for despatch by air mail to South Africa, and a great effort was made to ensure its speedy carriage. On June 30th, another consignment of 200 puparia was sent by air by Mr. R. C. Jeffery. The balance of the material, comprising 721 puparia was packed by Mr. Jeffery for shipment by boat and left in storage in the cold rooms of the U.S. Parasite Laboratory in Hoboken. Unfortunately, however, no vessel left for South Africa for several weeks and all of the Compsilura collected were dead when they arrived in Pretoria. It will therefore be necessary to repeat the collection in 1944.

Vegetable Crop Insects

Vegetable Green Bug (*Nezara viridula*)

This insect, which is of American origin, is widely distributed in the tropics and has been introduced into several parts of Australia where it causes severe damage to vegetables. A number of years ago a Hymenopterous egg-parasite of *Nezara* was introduced into Australia by the Federal Entomological Service. It has become established and causes a considerable mortality in the egg stage of the Green Bug but has not, by itself, been able to effect satisfactory control. The Chief Entomologist of the C.S.I.R., Dr. A. J. Nicholson, decided to introduce the American Tachinid *Trichopoda pennipes*, which habitually destroys large numbers of the pest in the Southern States. Preliminary efforts to obtain material, with the help of the State Entomologist of Florida, were made in 1941, and a small consignment of *Trichopoda* puparia was sent by air to Australia, but the number received alive was too small to be of any value.

Eventually it was decided that to obtain a satisfactory amount of material it would be necessary to send an entomologist to Florida. The State Entomologist informed us that no transportation to infested areas could be obtained locally so Mr. Simmonds left by car for Florida on October 27th and carried on survey and collection for almost a month, returning on November 24th. Six consignments of adult Nezara parasitised by *Trichopoda*, and comprising 3,691 specimens, were despatched by air mail to Australia, through the help of the Australian Supply Mission in Washington. A rather heavy mortality occurred in the consignments but over 450 Trichopoda puparia were secured and 368 Trichopoda adults were liberated. Later, specimens of Nezara bearing Trichopoda eggs were collected in the colonisation areas, one of these about a quarter of a mile from the liberation point. From one specimen collected, a Trichopoda larva eventually emerged. The results of the work are regarded in Australia as encouraging. Arrangements have been made for more extensive collections in 1944.

Potato Tuber Moth (*Gnorimoschema operculella* Zell.)

This insect, a native of the Americas, is causing great damage to stored potatoes in Australia. It attacks the tubers in storage but also lives, during the early part of the season, as a leaf-miner in the growing plants.

A number of parasites, which appear to exert an important controlling effect in nature, attack the Potato Tuber Moth in North and South America. California is considered the most suitable centre for the work. Professor H. S. Smith, in charge of the entomological work at the Citrus Experiment Station in Riverside, California, very kindly offered to provide working quarters and advice. Mr. W. F. Sellers went to California at the end of April where he made extensive surveys and collections of Potato Tuber Moth. As the Australian Entomologists were anxious to avoid the danger of importing secondary parasites special attention was paid to the breeding of all parasites collected. Successful methods were developed. Fifteen consignments, estimated to contain about 17,000 specimens representing four species of parasites of the Potato Tuber Moth: *Campoplex phthorimææ*, *Chelonus phthorimææ*, *Microbracon gelechiæ* and *Microdus gibbosus* were shipped. A consignment of *Macrocentrus ancylivorus*, the Oriental Peach Moth parasite was also sent to Australia for field tests against Potato Tuber Moth.

During the same period four shipments of *Chelenus phthorimææ* comprising about 5,000 specimens and seven shipments of *Microbracon gelechiæ*, comprising about 2,100 specimens, were despatched to South Africa. Mr. G. Rosenberg, a Chilean entomologist interested in the same project and visiting Riverside, was helped by Mr. Sellers; two consignments of *Chelonus phthorimææ* with 2,200 specimens and two of *Microbracon gelechiæ*, with 135 specimens, were sent to Chile. Two lots of Microbracon were supplied to Mr. G. Cummings, Agricultural Commission, for use in Santa Barbara. Finally a stock of Chelonus comprising 50 specimens in three shipments were supplied to headquarters in Belleville for breeding work there.

During the course of his work in South America, Dr. D. C. Lloyd made enquiries about parasites of the Potato Tuber Moth and learnt of some promising species which are not available in North America. These will be collected when opportunity occurs.

Cabbage Butterfly (*Pieris rapæ* L.)

It appears from information received from Australia that the American race of *Apanteles glomeratus* L., sent from Belleville to Canberra in 1942, has become acclimatized in areas infested by *Pieris rapæ*, while the European race, introduced from Great Britain, has not survived. If this is substantiated, it agrees with the experiences in New Zealand. Such facts would suggest that since its

introduction into America in 1883 by Riley, Apanteles glomeratus has produced a strain especially well adapted to *Pieris rapæ* or that by a fortunate accident, such a race was originally obtained from Europe by Riley.

Brown Vegetable Weevil (*Listroderes obliquus* Gyll.)

This is an insect of South American origin which has spread to South Africa, Australia and the Southern United States. Its larvæ are slug-like and feed on the leaves of various vegetable crops. At the request of the Chief Entomologist of South Africa Dr. D. C. Lloyd began an investigation of the parasites of this insect early in 1943. Almost 6,000 specimens of the larvæ of the Weevil were collected from various localities during the months of August, September and October. Two species of Ichneumonids of the genus Porizon, a Braconid of the genus *Triaspis* and a Tachinid of the genus *Epiplagiops* were discovered and considerable progress in breeding them was made.

Tobacco Slug (*Lema bilineata* Germar)

The Tobacco Slug is another South American insect, introduced into South Africa about the time of the Boer War. In addition to tobacco it attacks other plants, such as the cultivated Cape gooseberry (*Physalis peruviana*), potato and tomato.

At the request of the Chief Entomologist of South Africa Dr. Lloyd started to investigate its parasites in Uruguay in 1943. Eventually some slight infections were found on wild solanaceous plants near Montevideo. A Eulophid parasite destroying 60 per cent. to 70 per cent. of the egg masses and an effective Tachinid parasite of the larval stage, were discovered. These will be shipped to South Africa when a sufficient number has been obtained.

Cereal and Forage Crops Insects

Frit Fly (*Oscinella frit* L.)

This important pest of cereals is regarded as having a holarctic distribution. It is widely distributed throughout Europe and North America. In America it appears to be most common in wheat and grasses but rarely attracts attention. In Europe, however, it attacks oats, often causing serious damage.

Work on the North American parasites of the Frit Fly was continued by Mr. F. J. Simmonds, on the instructions of Mr. J. C. F. Fryer, Chief Entomologist of Great Britain. In the hope of obtaining species of parasites, not hitherto found in Canada, Mr. Simmonds worked in Tennessee, where the State Entomologist kindly provided accommodation and facilities in the University Laboratories at Knoxville. Wheat was planted here and at other points in the Eastern United States, as well as at Belleville. However, the delay caused by the work on Compsilura in the New England States combined with a severe drought in the South, affected adversely the experimental plantings and though additional information was secured about the distribution of some of the parasites, the work did not yield satisfactory results. Even in the Belleville district, possibly owing to the very long and severe winter of 1942/43, the Frit Fly and its parasites were extremely scarce.

However, experimental work continued by Mr. Simmonds in the off-season produced good results. A method was developed for the mass production of the parasite *Spalangia drosophilæ*, at very low cost, by the use of Drosophila in the puparial stage as host. Selection experiments to improve the sex ratio were also carried out with encouraging results.

Grasshoppers

Grasshoppers are pests of world-wide importance. Measures taken for their control entail the annual expenditure of great sums of money and provide only temporary relief. There is no doubt that the many parasitic and predacious enemies of grasshoppers often kill off large numbers and sometimes produce markedly beneficial effects, either by preventing outbreaks or by bringing them to an end. However, little accurate information as to the economic importance of their natural enemies is as yet available and no thorough-going attempts to utilise them in a practical way have been made, though this has been strongly recommended by entomologists of high standing.

For these reasons, the Dominion Parasite Laboratory of the Canadian Division of Entomology has been carrying on for some years an extensive study of the parasites of native grasshoppers in various parts of Canada and made arrangements for an exchange of grasshopper parasites with Argentina. It was found, however, that the conduct of this work required a full-time entomologist for a considerable period. Dr. D. C. Lloyd was given this work as one of his major projects.

As the entomological facilities in Uruguay, where Dr. Lloyd is stationed at present, are somewhat meagre, the area to be explored extensive and transportation difficult, particularly under present conditions, much exploratory work was needed to ascertain the basic facts about grasshoppers and their parasites.

In the early part of 1943 Dr. Lloyd consulted all the entomological authorities in Uruguay and Argentina, mapped out the area and collected grasshoppers in a number of localities chosen with a view to obtaining information about the parasites of the most abundant species under the greatest possible variety of ecological conditions. Four of the commoner grasshoppers: *Scyllinops variabilis*, *Dichroplus elongatus*, *Dichroplus pratensis* and *Dichroplus conspersus*, were selected. In all, some 12,000 specimens of these species were collected over a period of about four months of the South American summer. Both rearing and dissection were employed in order to estimate parasitism.

Generally speaking the percentage of parasitised grasshoppers among the species studied was low and only one species of parasite—probably *Protodexia australis* Blanch., was positively identified. No parasites at all were obtained from Scyllinops, with the exception of some Nematodes.

In the autumn of 1943, at Dr. Lloyd's request, a small consignment of Canadian parasites of grasshoppers, comprising 102 specimens of *Sarcophaga hunteri* and 35 specimens of *Sarcophaga atlanis*, were despatched to him by air. However, owing to delays *en route* only a few adult flies were secured and it was impossible to make liberations or even initiate breeding work.

In the circumstances, the collection of any quantity of parasite material in South America for export to Canada was not possible. However, three lots of 56 specimens representing at least two species, were despatched to Belleville.

Plans have been made for more extensive collections in the coming year.

Wheat-Stem Weevil (*Hyperodes griseus* Hust.)

This weevil, of South American origin, has been introduced into New Zealand, where it now does considerable damage to wheat. South American entomologists state that it is common in Argentina. At the request of the Chief Entomologist of New Zealand, an investigation of its parasites was undertaken by Dr. D. C. Lloyd.

Field studies were begun in the autumn of 1942 in Argentina and Uruguay. About 32,000 wheat stalks

were examined in Uruguay and 259 stalks were found to be attacked by Hyperodes, but no parasites were discovered. In the spring of 1943, wheat in the southern and western portions of Uruguay was studied, 24,000 plants were examined, belonging to 13 varieties distributed in seven localities; 231 stalks attacked by *Hyperodes* were found but only one specimen was parasitised. A fairly extensive study of Hyperodes in various wild grasses was also made.

To determine parasitism, about 2,000 wheat stalks and about 1,700 Lolium stalks attacked by Hyperodes were collected. Nine Hyperodes from wheat and 113 from Lolium were found to be parasitised. Three parasites were involved; a brachypterous Ichneumonid and two Chalcids, which have not yet been determined. The parasite survey will be continued and, if possible, extended in 1944/45.

Karroo Caterpillar (*Loxostege frustralis*)

This insect, native to South Africa, often causes serious loss by its destruction of the foliage of forage plants on the veldt. It has a number of fairly close allies, of which one of the most common is the Sugar-beet Webworm, in Europe and North America. Collections of the parasites of this insect for experimental introductions were therefore requested by the Chief Entomologist of South Africa. This work was initiated in 1941 and the results obtained up to the end of the financial year 1942/43 have been described in a preceding report. Efforts to secure supplies of parasitised material were made toward the close of the summer of 1943 but were unsuccessful.

White Grubs (*Melolonthidæ*) and Grass Grubs (*Hepialidæ*)

Studies made by the Chief Entomologist of New Zealand in South America indicated that parasites that might be useful against the White Grubs and Grass Grubs of New Zealand, can be obtained in South America. Dr. Lloyd is investigating these problems and has secured some useful information. It is hoped that preliminary field studies can be made during the next financial year.

Tropical Fruit Insects

Red Scale and Black Scale

Parasites of these important pests of citrus fruits, which do serious damage in many parts of the world, were despatched from California to Australia by Dr. D. C. Lloyd in the autumn of 1942. We have since been informed by the Chief Entomologist of the Commonwealth Council for Scientific and Industrial Research that they are being successfully bred in the Laboratories of the Entomological Service in Canberra and have been distributed to several parts of Australia for liberations in infested areas.

Weed Insects

Prickly Pear Insects (*Opuntia* spp.)

The Chief Entomologist of South Africa has instructed us to search for certain species of *Mealy Bugs* which have proved particularly valuable for the control of Prickly Pear in South Africa. The Mealy bugs in question attack Prickly Pear in certain parts of Argentina and new stocks are now desired. Dr. Lloyd will carry out this investigation. He has made preliminary enquiries and collections.

Acanthospermum hispidum

This plant is a troublesome weed in certain parts of the tropics and the importation of its specific insect enemies as controlling agents is under consideration in both India and Nigeria. *A. hispidum* and allied species exist in Uruguay and Dr. Lloyd has been asked to make preliminary study of the insects attacking it.

Cordia interrupta

The Government of Mauritius is considering the importation of the insect attacking this introduced plant which is a native of the West Indies, and South America. An effort is being made to arrange for this work, in co-operation with the Imperial College of Agriculture in Trinidad.

Parasite Catalogue

During the year the revision of the names of the hosts and insects in the first series of volumes of the Parasite Catalogue (covering records from 1913 to 1937 inclusive) was completed. Parts 1, 2, 3 and 4 of Section 1, comprising the parasites of the Arachnida, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isopoda and Isoptera, were published. Part 1, comprising 160 pages, lists about 1,000 species of hosts with about 1,300 species of parasites; Part 2, comprising 104 pages, about 600 species of hosts with about 900 species of parasites; Part 3, comprising 154 pages, about 1,000 species of hosts with about 1,500 species of parasites; Part 4, comprising about 135 pages, about 980 species of hosts with about 1,130 species of parasites. The volumes have been printed by the Multigraph method, are approximately Crown 4to and each part is bound separately in cloth-covered boards. They are now on sale at $2.00 each (10s. in the United Kingdom). 500 copies of each part have been printed.

The heavy work of nomenclatorial revision has been mainly carried out by the taxonomists of the Division of Insect Identification of the U.S. Bureau of Entomology, working in the U.S. National Museum, at Washington, under the direction of Mr. C. F. W. Muesebeck; and of the Systematic unit of the Entomological Service at Ottawa, under the direction of Dr. J. H. McDunnough. Sir Guy K. Marshall kindly revised the names of the Coleoptera. We are greatly indebted to the entomologists who undertook this laborious work and to Dr. P. N. Annand, Chief of the U.S. Bureau of Entomology, Dr. A. Gibson, lately Dominion Entomologist, and Mr. H. G. Crawford, his successor, for permitting it to be carried out by their officers.

The preparation of the material for publication was carried out by the Director, Mr. R. C. Jeffery and Miss M. Thompson. The plates for the work were typed and the printing executed by Miss M. Thompson.

During the same period, the preparation of the subsequent parts of the Catalogue has been carried forward and the compilation of new records has also been continued.

Other Publications

Since the transfer of the Imperial Parasite Service to Belleville, the following papers have been published by the staff.

"Further experiments on host selection by hymenopterous parasites of the moth, *Plutella maculipennis* Curtis," by D. C. Lloyd; Rev. Canadienne de Biologie, Vol. 1, No. 6, August, 1942.

"The occurrence of superparasitism in *Nemeritis canescens* Grav." by F. J. Simmonds; Rev. Canadienne de Biologie, Vol. 2, No. 1, February. 1943.

"The Distribution of the European Spruce Sawfly, *Diprion polytomum* (Htg.) in the Scandanavian and Eastern Baltic countries," by W. F. Sellers; Bull. Ent. Research, Vol. 33, Pt. 3, September, 1942.

"The Nearctic species of Parasitic Flies belonging to Zenillia and allied Genera," by W. F. Sellers, Proc. U.S. Nat. Museum, Vol. 93, 1943.

"A mathematical Analysis of the Distribution in Maize of *Heliothis armigera* Hb. (obsoleta F.)," by Mr. G. Walker; Can. Journ. Research, Vol. 20, August, 1942.

"Notes on the Biology of *Dexia rustica* F., a Dipterous parasite of *Melolontha melolontha* L.," by M. G. Walker, Proc. Zool. Soc., Ser. A., Vol. 113, 1943.

Staff Changes

Mr. R. C. Jeffery, Senior Clerk of the Imperial Parasite Service resigned because of ill-health and returned to Great Britain in the last quarter of the financial year.

Parasite Shipments

The following is a summary of the parasite shipments made by the Service during the financial year :

Total number of shipments made by the Imperial Parasite Service during the financial year 1943–44	59
Total number of insects shipped by the Imperial Parasite Service during the financial year 1943–44	91,496
Total number shipped to date	1,160,574

W. R. THOMPSON.

APPENDIX IV

WORK ON THE SOUTH AMERICAN POTATO COLLECTION

UP TO 31st DECEMBER, 1944

supplied by

Dr. P. S. HUDSON

The Collection

(*a*) Distribution. Distribution of samples was difficult, owing to transport and to the necessity of being sure that the samples distributed were free from virus. But between 1st April, 1943, and 31st December, 1944, 646 tubers representing 286 varieties and 73 seed samples were sent to Empire countries overseas. The bulk went to South Africa, viz, 515 tubers representing 232 varieties and in addition 9 packets of seed. To Peru, whence many of the potatoes originally came, seven seed samples were sent.

In addition to the above, 760 varieties comprising 2,111 tubers and also 3 packets of seed were sent to six scientific centres in the United Kingdom where much greatly appreciated help in testing the characteristics of those potatoes is being given.

(*b*) Accessions. The war has not entirely broken the relations with South America established by Mr. Balls and Dr. Hawkes during their collecting tour in 1939. 483 tubers representing 162 varieties were received from South American countries during this period, also samples of a South American variety were received from the United States.

Scientific Work on the Collection

The work followed the same lines as in the previous year.

(*a*) Systematics. (Dr. Hawkes.) Most of this had already been done (*vide* last year's report). The results were published in the early summer of 1944. The Taxonomy and Systematic Classification of the South American Potato Collection. Another 128 lines were classified during 1945 and 107 duplicate herbarium specimens and 42 corolla preparations were deposited in the herbarium at Kew towards a permanent record of this collection.

(*b*) Cytology. (Dr. Hawkes and Dr. Koppel.) This was also far on. Chromosome counts were made of another 248 lines received from South America after the return of the expedition.

(*c*) Virus. (Dr. Wortley, the Potato Virus Research Station, Cambridge, and Dr. Koppel.) The determination of the sap transmissible virus content of each tuber line of the Collection has been completed.

Three hundred and twenty-nine out of the total 1,236 samples are at present (December, 1944) free from any visible mosaic, leaf-roll and sap—transmissible virus capable of producing symptoms on the test plants employed (White Burley Tobacco, *Datura Stramonium* and *Capsicum annuum*). 241 of these are original tuber lines which have escaped infection, the other 88 have been obtained in a virus free condition by raising from true seed. In 200 of the tuber-propagated samples no virus disease has been observed in any individual plants at any time. It would therefore seem that virus resistance is likely to be present in this group, though resistance to specific viruses may be present in a wider range. *Solanum adjuscoënse*, *S. Antipoviczii*, *S. calcense*, *S. Garciæ* and *S. Jamesii* appear to be particularly promising species. Also many samples among *S. andigenum* have survived for 3–5 years in a virus free condition.

The increased accommodation in the new greenhouses will allow the severely virus diseased, the slightly diseased and the healthy samples to be grown in separate compartments, and will enable tests for virus resistance to be conducted on a large scale.

(*d*) Blight Resistance. (Dr. Dickinson, School of Agriculture, Cambridge.) The leaves of most of the collection had been tested ; the tubers had still to be tested (last year's report). Leaves of 84 clones and tubers of 126 clones were tested against six different isolations of blight fungus. Twenty additional clones have been found to be highly resistant or immune to all six isolations.

(*e*) Frost Resistance. (Dr. Driver working with the Low Temperature Research Station.) Up to last year's report about 1,000 lines had been tested. In this period another 400 were tested, leaving only about 100 of the original collection still to do. From the results of all the tests in the last three seasons 216 lines showing varying degrees of resistance have been selected for further test.

(*f*) Wart Resistance. (Mr. Samuel, Ministry of Agriculture and Fisheries, Plant Pathology Laboratory, Harpenden.)

Of 273 lines supplied, 151 proved susceptible, 63 gave no reaction and in the remainder the test was incomplete. Those giving no reaction are to be tested again before being considered immune, and 236 lines were supplied in testing.

(*g*) Eelworm Resistance. (Dr. Leiper, Institute of Agricultural Parasitology, and Dr. Ellenby, Newcastle-on-Tyne.)

Three hundred and eight lines were sent to Dr. Leiper. According to a preliminary report nine varieties escaped infection and others were less infected than ordinary commercial varieties. Further testing of these apparent resisters is in progress.

In the 37 varieties supplied to him, Dr. Ellenby found in a small number, indications of immunity or of high resistance. These results are being followed up.

(*h*) Chemical Composition. (Mrs. Osancova, Mr. Driver and Dr. Koppel.)

Two hundred and fifty-seven varieties in the collection

and 50 commercial varieties were tested for Vitamin C and dry matter. The values for Vitamin C and the range of variations were less than in the samples previously sampled. The results of the previous work were written up but publication has been deferred in view of the possibility that the Vitamin C results may have been vitiated in some cases by the presence of virus. This possibility will be tested in 1945.

(*i*) Photoperiodism. (Mr. Driver and Dr. Hawkes.) The results of the examination up-to-date were published in December, 1943 (*vide* paragraph 7 above).

(*j*) Seed Production. (Dr. Hawkes, Mr. Driver and Miss Sharpe.)

A further 320 lines of seed were added to the collection. Seed of nearly all the fertile varieties has now been obtained. A start has been made in crossing the difficult varieties with pollen fertile ones.

The field plots at Edinburgh, proved useful. Special frames were made for short day varieties to reduce their daylight period under 12 hours. The plots and frames gave much material for herbarium specimens, for biochemical examination, for cross and self pollination, etc. They will also be very helpful for providing material of known properties for distribution. They are, in fact, the necessary supplement to the greenhouses at Cambridge. Dr. Hawkes and Mr. Driver visited and worked on them during the planting, growing and lifting seasons. Their general care was in the charge of Dr. H. P. Donald. It is due to his interest, supervision and help that the natural facilities offered by Edinburgh are being used to advantage.

P. S. HUDSON.

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Animal Health— Veterinary Laboratory, New Haw, Weybridge, Surrey, England.	Professor T. Dalling, M.A., M.R.C.V.S.	W. A. Pool, M.R.C.V.S.
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Plant Breeding and Genetics— School of Agriculture, Cambridge, England.	Sir Frank Engledow, C.M.G., M.A.	P. S. Hudson, Ph.D.
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Forestry— Imperial Forestry Institute, 39, Museum Road, Oxford.	Professor H. G. Champion, C.I.E.	J. W. B. Sisam, B.Sc. in F., M.F.
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